

REMARKS

In the Office Action the Examiner first objected to Claims 1, 28, 29 and 30 under 37 C.F.R. § 1.75, citing MPEP § 706.03(k), as being a substantial duplicate of Claim 1. Applicant respectfully disagrees and reconsideration is requested.

The leading paragraph of MPEP § 706.03(k) specifically acknowledges, “court decisions have confirmed applicant’s right to restate (i.e., by plural claiming) the invention in a reasonable number of ways. Indeed, **a mere difference in scope between claims has been held to be enough**”(emphasis added). In the present case, Claim 1 is directed to an optical structure for processing optical energy, which is a broad recitation of a number of devices, in the form of a genus. Claims 28, 29 and 30, on the other hand, are directed to particular devices including a laser, an LED and an optical switch. Thus, there is clearly **a difference in scope of the claims**.

Although the particular devices of Claims 28, 29 and 30 fall within the genus, they are not duplicates of Claim 1. In this regard, the Claims do not cover “the same things” wherein Claim 1 is directed to an optical structure for processing optical energy, Claim 28 is directed to a laser, Claim 29 is directed to an LED and Claim 30 is directed to an optical switch. Clearly, these are separate items, notwithstanding the fact that the items of Claims 28, 29 and 30 fall within the genus of Claim 1.

As for the citation by the Examiner of the line of cases beginning with *Miller v. Eagle Mfg. Co.*, applicant submits that these cases are inapposite. In contrast to the present situation, the cases deal with obtaining more than one patent on the same invention. Here, only one patent is sought because the items defined in each of the claims are so closely related as to be claimed together. Although the subject matter of the various independent claims of the present application are not “drawn to identical subject matter”, as set forth above, they are related as are genus and species.

Since the items are, at the very least, different in scope, they are not duplicate claims under the rules. Therefore, removal of this objection is respectfully requested.

Next the Examiner rejected Claims 1-13 and 15-30 under 35 U.S.C. 112, second paragraph. The first comment was that Claims 1, 18 and 30 omitted elements of optical structure for processing optical energy and generating the laser. However, it is precisely the metal layer with a plurality of voids and the active material substantially adjacent to the voids that processes the energy and generates the laser (see generally,

specification p. 13, lines 25). The second comment was that Claims 1, 18 and 30 omitted structural relations between the metal layer and the voids. However, the claims clearly state that the surface of the metal layer has a plurality of voids, setting forth the relationship.

Claims 1-13 and 15-30 were also described as being “confusing, vague and indefinite”, the Examiner stating that there is no structure to support the device. In response, applicant has added the element of a substrate for supporting the metal layer and the effects of the voids in the metal layer and the active or non-linear material within the structure in the independent Claims 1, 28, 29 and 30. Support for these elements is found throughout the specification, and particularly at, *inter alia*, p. 13, lines 9-25, which recites a preferred embodiment of the invention including the substrate, the metal layer with a plurality of voids and the active material to act on the light energy.

The Examiner also stated that Claim 17 recites a laser, LED, a wavelength converter, a sensor or a switch but that the structure is not related to the invention. Claims 28-30 were objected to on similar grounds. Applicant avers that the structure recited is sufficient to define the items listed. In this regard, all that is needed to define the items is the metal layer and the active or non-linear material where an optical energy source, such as a light or a voltage is applied across the device to emit optical energy or change the properties of the energy.

For example, with a laser the metal layer and active material would be pumped with light energy or electrically to emit light from the active material, with the holes in the metal layer serving to couple the light. Similarly, although a switch is not light emitting, the claimed non-linear material provides non-linear optical interaction to make a more efficient and practical optical switch, requiring less power to operate. As such, the claims provide the sufficient structure to define the items claimed.

With respect to Claims 18-27, these are method claims, reciting the step of directing optical energy at a first surface of a metal layer comprising a plurality of voids with an active or non-linear material substantially adjacent thereto. Since the step of the method is defined, there is no need to provide more structure in the method claims.

Additionally, applicant points to the claims of the Kim et al. reference cited in the Office Action, U.S. Patent No. 6,040,936. This reference defines a tunable optical filter by the same general elements. Although the device of Kim et al. is not the same as that defined by the present invention, as more fully set forth below, it illustrates that an optical device need not have additional elements to be properly defined.

In view of the above, including the comments therein, removal of this rejection is respectfully requested.

Turning to the substantive matters raised, the Examiner rejected Claims 1-13 and 15-30 under 35 U.S.C. §102(b) as being anticipated by Kim et al., (U.S. Pat. No. 6,040,936) (hereinafter "Kim et al."). Reconsideration is respectfully requested.

The most significant distinction between the present claimed invention and the devices of Kim et al. is the fact that Kim et al. describes a tunable filter having a metal film and a supporting layer having a selectively variable refractive index. Nowhere is the supporting layer of Kim et al. defined as an active or non-linear material as presently claimed, since the devices referred to in Kim et al. have a different purpose which does not benefit from such materials. In sharp contrast to the type of device described in Kim et al., the present claimed invention makes use of the active or non-linear material to provide enhanced effects to the optical energy.

Significantly, the type of device described by Kim et al. does nothing more than provide a spectral response to a light transmitted through the device. Kim et al. utilizes a liquid crystal to put voltage across the device for a change in intensity of the light. The active or non-linear material of the present invention, however, would not lend anything to the device of Kim et al. since the use of these materials do not provide sufficient change for the applications recited in Kim et al.

However, in the present claimed invention the use of active or non-linear material with the plurality of voids in the metal layer provides enhancements to the light interaction particular to such devices as a laser, LED, wavelength converter, sensor or switch. Since tunable filters, as described in the Kim et al. reference, do not require enhancement of the optical energy, providing only a spectral response, there is no need to use the active or non-linear material presently claimed. In other words, Kim et al. does not disclose or suggest the use of the presently claimed active or non-linear material, as it is not useful in creating the tunable filter described therein.

In this regard, the Examiner stated that Kim et al. discloses an active or non-linear material associated with at least a portion of the plurality of voids at col. 5, lines 26-33. However, the Kim et al. reference makes no such showing. Instead, the only description in Kim et al. deals with a tunable filter, which, for the reasons set forth above, does not remotely suggest the use of an active or non-linear material as presently claimed.

Based on the foregoing, applicant respectfully submits that the Kim et al. reference does not anticipate the present claimed invention. More particularly, where the use of one or more of the active and/or non-linear material is required in each of the present claims, including the utility and method claims, none of the present claims are anticipated by the Kim et al. reference.

Furthermore, the deficiencies of the Kim et al. reference are not cured by combination of the Kim et al. reference with the additional art cited by the Examiner in the present application. Therefore, applicant submits that the subject matter of the present claimed invention is patentable over the cited prior art.

Based on the above amendment and remarks, applicant respectfully submits that all of the pending claims are now allowable over the prior art and that they are in proper form for allowance.

Favorable consideration and early allowance of all of the pending claims is respectfully requested and earnestly solicited in light of the foregoing.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

1. (twice amended) An optical structure for processing optical energy comprising:

a metal layer having a first surface comprising a plurality of voids having a dimension less than the wavelength of optical energy being processed; [and]

change return
an active or non-linear material [operatively associated with] substantially adjacent to at least a portion of the metal layer in the area of the plurality of voids wherein the plurality of voids in the metal layer exhibit localized plasma resonances that enhance emission and absorption of optical energy through the active or non-linear material; and

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a substrate for supporting the metal layer.

method
18. (twice amended) A method for [optical processes] processing optical energy comprising directing optical energy at a first surface of a metal layer, said surface comprising one or more voids having a dimension less than the wavelength of optical energy being processed and an active or non-linear material [operatively associated with] substantially adjacent to at least a portion of the plurality of voids.

28. (twice amended) A laser comprising:

a metal layer having a first surface comprising a plurality of voids, said voids having a dimension less than the wavelength of optical energy being processed; [and]

an active material [operatively associated with] substantially adjacent to at least a portion of the metal layer in the area of the plurality of voids wherein the plurality of voids in the metal layer exhibit localized plasma resonances that enhance emission of optical energy through the active material; and

a substrate for supporting the metal layer.

29. (twice amended) An LED structure comprising:

a metal layer having a first surface comprising a plurality of voids, said voids having a dimension less than the wavelength of optical energy being processed; [and]

an active material [operatively associated with] substantially adjacent to at least a portion of the metal layer in the area of the plurality of voids wherein the plurality of

voids in the metal layer exhibit localized plasma resonances that enhance emission of optical energy through the active material; and

a substrate for supporting the metal layer.

30. (amended) An optical switch structure comprising:

a metal layer having a first surface comprising a plurality of voids, said voids having a dimension less than the wavelength of optical energy being processed; [and]

a non-linear material [operatively associated with] substantially adjacent to at least a portion of the metal layer in the area of the plurality of voids wherein the plurality of voids in the metal layer exhibit localized plasma resonances that enhance emission of optical energy through the non-linear material; and

a substrate for supporting the metal layer.